

10/5/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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11458519 **Image available**

WPI Acc No: 2002-179220/200223

Related WPI Acc No: 2002-179047; 2002-179048; 2002-179222; 2002-443510;
2002-443512; 2002-617869; 2002-655656; 2002-722945; 2003-039635;
2003-331594; 2003-786619

XRPX Acc No: N02-136329

Exclusive two - level caching method for chip-multiprocessor,
involves providing second tag state structure in second level cache so
that simultaneous look-up at duplicate of the structures is possible
Patent Assignee: BARROSO L A (BARR-I); GHARACHORLOO K (GHAR-I); NOWATZYK A
(NOWA-I)

Inventor: BARROSO L A; GHARACHORLOO K; NOWATZYK A

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020010836	A1	20020124	US 2000210655	P	20000609	200223 B
			US 2000210675	P	20000610	
			US 2001877530	A	20010608	

Priority Applications (No Type Date): US 2001877530 A 20010608; US
2000210655 P 20000609; US 2000210675 P 20000610

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20020010836	A1	15	G06F-012/00	Provisional application US 2000210655

Provisional application US 2000210675

Abstract (Basic): US 20020010836 A1

NOVELTY - The method involves providing in a second level **cache** a second tag state structure so that a simultaneous look-up at the duplicate of the first tag state structure and the second tag state structure is possible. A single owner is associated with a **cache** line at any given time of a **cache** line lifetime in the chip-multiprocessor.

DETAILED DESCRIPTION - The first tag state structure is provided in a first level **cache** of the two level **cache** system. A duplicate of the first tag state structure is maintained in a second level **cache** of the two level **cache** system. INDEPENDENT CLAIMS are also included for the following:

(a) a method for maximizing the use of on-chip **cache** memory capacity in a chip multiprocessor;

(b) and a two-level **cache** system in a chip multiprocessor.

USE - Used for exclusive two-level catching in a chip-multiprocessor.

ADVANTAGE - Minimize data replication and on-chip data traffic without incurring an increased **second level** hit latency or occupancy. Allows a substantially **simultaneous look-up** for data in the **first level** and **second level** tag state arrays. Eliminates redundant write-backs of evicted data to the **second level cache**.

DESCRIPTION OF DRAWING(S) - The figure shows the chip multiprocessor design implementation.

pp; 15 DwgNo 1/7

Excluded Terms: EXCLUDE; TWO; LEVEL; METHOD; CHIP; MULTIPROCESSOR; SECOND; TAG
; STATE; STRUCTURE; SECOND; LEVEL; **CACHE** ; SO; SIMULTANEOUS; UP;
DUPLICATE; STRUCTURE; POSSIBILITY

Derwent Class: T01

International Patent Class (Main): G06F-012/00

File Segment: EPI

10/5/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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G13491869 **Image available**

WPI Acc No: 2000-663812/200064

XRPX Acc No: N00-491838

Data buffering apparatus in computer system, directs simultaneously portion of data transmitted by processor and that received by input-output device, to different buffers located at different levels in memory

Patent Assignee: DIGITAL EQUIP CORP (DIGI)

Inventor: CLAFFEY J T; EGGLESTON D P; GIANOS C C; GUSTAFSON T L; MCCORMACK J J

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6112267	A	20000829	US 9886134	A	19980528	200064 B

Priority Applications (No Type Date): US 9886134 A 19980528

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 6112267	A	30	G06F-013/14	

Abstract (Basic): US 6112267 A

NOVELTY - Two selectors are provided to choose write and read buffers among multiple buffers to store data transmitted by processor (300) and to store data to be received by input-output device (700). A portion of data transmitted by processor to write buffer and that received by input-output device from **read** buffer, are **simultaneously** directed at **different** buffers located at **different** levels in memory.

DETAILED DESCRIPTION - Multiple ring buffers (212,312,412) are allocated at different levels of the memory. The buffers are connected to the processor and input-output device, such that the processor and input-output device can simultaneously access the same buffer. The primary, secondary and tertiary levels of the memory are arranged on an IC with the processor, in off-chip **cache** and in DRAM, accordingly. The selector selects the read buffers in an identical order as write buffers. Control values indicating the order for selecting read buffers, are stored in software based registers stored in DRAM of input-output device. The control values include head pointer, tail pointer, length and base addresses associated with each of several buffers. An INDEPENDENT CLAIM is also included for data buffering method.

USE - For optimizing memory utilization in communication between processor and input-output device.

ADVANTAGE - Makes use of hierarchical memory buffers to dynamically direct the data flow from the processor to input-output device through the buffers. Optimizes use of memory of different levels in memory hierarchy, as the need for buffer space dynamically varies during computer system operation. The use of multiple buffers and dynamic switching between buffers, enhance the flow of data from processor to input-output device via the buffers. The switching technique permits the use of higher bandwidth **cache** based buffers with switches to main memory buffer, when the need for larger buffer arises. Permits the relatively continuous flow of software produced data to be maintained while supporting the very high speed hardware mediated DMA reads of a graphics device or similar devices. Hence computer system with greatly improved graphics output is offered.

DESCRIPTION OF DRAWING(S) - The figure shows block diagram of primary components of data buffering apparatus.

Ring buffers (212,312,412)

Processor (300)

Input-output devices (700)

pp; 30 DwgNo 1b/6

Title Terms: DATA; BUFFER; APPARATUS; COMPUTER; SYSTEM; DIRECT;

SIMULTANEOUS; PORTION; DATA; TRANSMIT; PROCESSOR; RECEIVE; INPUT; OUTPUT; DEVICE; BUFFER; LOCATE; LEVEL; MEMORY

Derwent Class: T01

International Patent Class (Main): G06F-013/14

International Patent Class (Additional): G06F-013/16

File Segment: EPI

10/5/3 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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012470486 **Image available**
WPI App No: 1999-276594/199923
EPI App No: N99-207338

Single chip with integrated processor and level two DRAM in multiprocessor system - maintains coherence between L2 cache having two port structure with data buffers for reload and store-back operation, by global directory with selectors and logic for directing cross-interrogates

Patent Assignee: INT BUSINESS MACHINES CORP (IBM)
Inventor: BOYD W T; HELLER T J; IGNATOWSKI M; MATICK R E; SCHUSTER S E
Number of Countries: 001 Number of Patents: 001
Patent Family:

Parent No	Kind	Date	Applicat No	Kind	Date	Week
US 5895487	A	19990420	US 96748300	A	19961113	199923 B

Priority Applications (No Type Date): US 96748300 A 19961113

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 5895487	A	21	G06F-012/08	

Abstract (Basic): US 5895487 A

NOVELTY - Coherence between L2 cache is maintained by global directory with selectors and logic for directing cross-interrogates to appropriate L2 cache. Each L2 cache is provided with pseudo two port structure with data buffers for reload and store-back operations. DETAILED DESCRIPTION - Each processor (511-51n) is provided with private level one (L1) cache and associated translation-memory management logic to implement set associative and late-select cache where each L1 cache is provided with multiported cache directory for fast coherency maintenance through fully shared Snoopy protocol. The L1 cache directories are interconnected through buses to allow simultaneous interrogation and update. The outputs of L1 caches are interconnected by a selector-cross point switch for transferring data between caches. Each L2 cache of processor is comprised by DRAM main memory and SRAM buffer and is having translation-management logic to implement set associative, late-select organization with DRAM directories. Logic and data circuits are provided for interfacing with an external memory management unit thereby facilitates single chip to work alone as single node system or to couple single chip to other identical nodes via an external controller.

USE - The single chip fabricated with integrated processor and level two DRAM is provided for multiprocessor system for portable computer.

ADVANTAGE - By integrating the processor and L2 DRAM cache on single chip, high on-chip bandwidth, reduced latency and higher performance are achieved. Overcomes number of issues which limit the performance and cost of memory hierarchy by implementing several processors on single chip which are either independent or shared using single chip technology. Eliminates chip-to-chip crossing, since L2 DRAM cache is placed on same chip. By improving bus utilization efficiency with on-chip L2 cache DRAM array and eliminating trailing edge effects, system performance is improved. Reduces power consumption when compared to other approaches using simple technique. Facilitates to use combination of coherency protocols. Since each processor has separate coherency bus path into each directory and local directory controls access to all incoming requests, several requests are handled at directory level. DESCRIPTION OF DRAWING(S) - The figure depicts block diagram of multiprocessor system. (511-51n) Processor.

Dwg.5/12

Title Terms: SINGLE; CHIP; INTEGRATE; PROCESSOR; LEVEL; TWO; DRAM;
MULTIPROCESSOR; SYSTEM; MAINTAIN; COHERE; CACHE ; TWO; PORT; STRUCTURE;

DATA; BUFFER; RELOAD; STORAGE; BACK; OPERATE; GLOBE; DIRECTORY; SELECT;
DIRECT; CROSS; INTERROGATION
Derwent Class: T01
International Patent Class (Main): G06F-012/08
File Segment: EPI

10/5/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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009473703 **Image available**
WPI Acc No: 1993-167244/199320
XRPX Acc No: N93-128064

Controller for two-way set associative cache - provides local storage
for frequently accessed memory locations

Patent Assignee: INTEL CORP (ITLC)
Inventor: CRAWFORD J H; IYENGAR S R; NADIR J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 5210845	A	19930511	US 90618708	A	19901128	199320 B

Priority Applications (No Type Date): US 90618708 A 19901128

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 5210845	A	16	G06F-012/00	

Abstract (Basic): US 5210845 A

The **cache** controller (10) sits in parallel with a microprocessor bus (14, 15, 29) so as not to impede system response in the event of a **cache** miss. The **cache** controller tagram (24) is configured into two ways, each way including tag and valid-bit storage for associatively searching the directory for **cache** data-array addresses. The external **cache** memory (8) is organised such that both ways are simultaneously available to a number of available memory modules in the system to allow access time to occur in parallel with the tag lookup.

USE/ADVANTAGE - Provides for 0, 64k, 128k **cache** with single socket and cascadable with **multiple** sockets. **Both** second- level **cache** and main memory can **simultaneously** look up access address.

Dwg.1/16

Title Terms: CONTROL; TWO; WAY; SET; ASSOCIATE; **CACHE** ; LOCAL; STORAGE;
FREQUENT; ACCESS; MEMORY; LOCATE

Derwent Class: T01; U14

International Patent Class (Main): G06F-012/00

International Patent Class (Additional): G06F-013/14; G11C-015/04

File Segment: EPI